

Subject Index / Index des matières¹

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| 00.00 | GENERAL | 04.40 | Continuous media; electromagnetic and other mixed gravitational systems |
| 01.00 | COMMUNICATION, EDUCATION, HISTORY, AND PHILOSOPHY | 04.50 | Unified field theories and other theories of gravitation |
| 01.10 | Announcements, news, and organizational activities | 04.60 | Quantum theory of gravitation |
| 01.30 | Physics literature and publications | 04.65 | Supergravity |
| 01.30B | <i>Publications of lectures (advanced institutes, summer schools, etc.)</i> | 04.80 | Experimental tests of general relativity and observations of gravitational radiation |
| 01.30C | <i>Conference proceedings</i> | 04.90 | Other topics in relativity and gravitation |
| 01.30E | <i>Monographs and collections</i> | 05.00 | STATISTICAL PHYSICS AND THERMODYNAMICS |
| 01.30K | <i>Handbooks and dictionaries</i> | 05.20 | Statistical mechanics |
| 01.30L | <i>Collections of physical data, tables</i> | 05.30 | Quantum statistical mechanics |
| 01.30N | <i>Textbooks</i> | 05.40 | Fluctuation phenomena, random processes, and Brownian motion |
| 01.30Q | <i>Reports, dissertations, theses</i> | 05.50 | Lattice theory and statistics; Ising problems |
| 01.30R | <i>Reviews and tutorial papers; resource letters</i> | 05.60 | Transport processes: theory |
| 01.30T | <i>Bibliographies</i> | 05.70 | Thermodynamics [*] |
| 01.40 | Education | 05.90 | Other topics in statistical physics and thermodynamics |
| 01.50 | Educational aids | | |
| 01.55 | General physics | 06.00 | MEASUREMENT SCIENCE, GENERAL LABORATORY TECHNIQUES, AND INSTRUMENTATION SYSTEMS |
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| 01.65 | History of science | 06.20D | <i>Measurement and error theory</i> |
| 01.70 | Philosophy of science | 06.20F | <i>Units</i> |
| 01.75 | Science and society | 06.20H | <i>Measurement standards and calibration</i> |
| 01.90 | Other topics of general interest | 06.20J | <i>Determination of fundamental constants</i> |
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| 02.20 | Group theory | 06.30E | <i>Mass and density measurement</i> |
| 02.30 | Function theory, analysis | 06.30F | <i>Time and frequency measurement</i> |
| 02.40 | Geometry, differential geometry, and topology | 06.30G | <i>Velocity, acceleration and rotation measurement</i> |
| 02.50 | Probability theory, stochastic processes, and statistics | 06.30L | <i>Measurement of basic electromagnetic variables</i> |
| 02.60 | Numerical approximation and analysis | 06.50 | Data handling and computation |
| 02.70 | Computational techniques | 06.60 | Laboratory techniques |
| 02.90 | Other topics in mathematical methods in physics | 06.70 | General instrumentation |
| 03.00 | CLASSICAL AND QUANTUM PHYSICS; MECHANICS AND FIELDS | 06.90 | Other topics in measurement science, general laboratory techniques and instrumentation systems |
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| 03.80 | General theory of scattering | 07.30 | Vacuum production and techniques |
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| 04.20 | General relativity | 07.30D | <i>Vacuum meters</i> |
| 04.30 | Gravitational waves and radiation: theory | 07.35 | High pressure production and techniques |

¹ The permission of the ICSU AB, Paris, for the Canadian Journal of Physics to use this subject classification is gratefully acknowledged.

- 07.50 Electrical instruments and techniques
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 07.60 Optical instruments and techniques
 07.60D *Photometry and radiometry*
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 07.60H *Refractometry and reflectometry*
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 07.65G *IR spectroscopy and spectrometers*
 07.68 Photography, photographic instruments and techniques
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 11.30 Symmetry and conservation laws
 11.40 Currents and their properties
 11.50 Dispersion relations and sum rules
 11.60 Complex angular momentum; Regge formalism
 11.80 Relativistic scattering theory
 11.90 Other topics in general field and particle theory
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 12.20 Models of electromagnetic interactions
 12.20D *Specific calculations and limits of quantum electrodynamics*
 12.20F *Experimental tests of quantum electrodynamics*
 12.25 Models for gravitational interactions
 12.30 Models of weak interactions
 12.35 Composite models of particles
 12.35C *General properties of quantum chromodynamics (dynamics, confinement, etc.)*
 12.35E *Applications of quantum chromodynamics to particle properties and reactions*
 12.35H *Phenomenological composite models of particle structure and reactions (partons, bags, etc.)*
 12.35K *Other composite models*
 12.40 Models of strong interactions
 12.40E *Statistical models*
 12.40F *Bootstrap models*
 12.40H *Duality and dual models*
 12.40K *Hadron classification schemes*
 12.40M *Complex angular momentum plane; Regge poles and cuts (Reggeons)*
 12.40P *Absorptive, optical, and eikonal models*
 12.40Q *Potential models*
 12.40R *Peripheral models (one or more particle exchange)*
 12.40S *Multiperipheral and multi-Regge models*
 12.40V *Vector-meson dominance*
 12.70 Hadron mass formulas
 12.90 Miscellaneous theoretical ideas and models
- 13.00 SPECIFIC REACTIONS AND PHENOMENOLOGY
 13.10 Weak and electromagnetic interactions of leptons
 13.15 Neutrino interactions
 13.20 Leptonic and semileptonic decays of mesons
 13.25 Hadronic decays of mesons
 13.30 Decays of baryons
 13.35 Decays of leptons
 13.38 Decays of intermediate bosons
 13.40 Electromagnetic processes and properties
 13.40D *Electromagnetic mass differences*
 13.40F *Electromagnetic form factors; electric and magnetic moments*
 13.40H *Electromagnetic decays*
 13.40K *Electromagnetic corrections to strong and weak interaction processes*
 13.60 Photon and charged-lepton interactions with hadrons
 13.60F *Elastic and Compton scattering*
 13.60H *Total and inclusive cross sections*
 13.60K *Meson production*
 13.60M *Meson-resonance production*
 13.60P *Baryon and baryon resonance production*
 13.65 Hadron production by electron-positron collisions
 13.75 Hadron-induced low- and intermediate-energy reactions and scattering, energy ≤ 10 GeV
 13.75C *Nucleon-nucleon interactions, including antinucleon, deuteron, etc. (energy ≤ 10 GeV)*
 13.75E *Hyperon-nucleon interactions (energy ≤ 10 GeV)*
 13.75G *Pion-baryon interactions (energy ≤ 10 GeV)*
 13.75J *Kaon-baryon interactions (energy ≤ 10 GeV)*
 13.75L *Meson-meson interactions (energy ≤ 10 GeV)*
 13.85 Hadron-induced high- and super-high-energy interactions, energy > 10 GeV
 13.85D *Elastic scattering (energy > 10 GeV)*
 13.85F *Inelastic scattering, two-particle final states (energy > 10 GeV)*
 13.85H *Inelastic scattering, many-particle final states (energy > 10 GeV)*
 13.85K *Inclusive reactions, including total cross sections (energy > 10 GeV)*
 13.85M *Cosmic ray interactions*
 13.88 Polarization in interactions and scattering
 13.90 Other topics in specific reactions and phenomenology of elementary particles
- 14.00 PROPERTIES OF SPECIFIC PARTICLES AND RESONANCES
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 14.40 Mesons and meson resonances
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 14.80 Other and hypothetical particles
- 20.00 **NUCLEAR PHYSICS**
- 21.00 **NUCLEAR STRUCTURE**
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 21.10H *Spin, parity, and isobaric spin*
 21.10J *Spectroscopic factors*
 21.10K *Electromagnetic moments*
 21.10M *Level density and structure*
 21.30 Nuclear forces
 21.40 Few-nucleon systems
 21.60 Nuclear-structure models and methods
 21.60C *Shell model*

- 21.60E *Collective models*
 21.60F *Models based on group theory*
 21.60G *Cluster models*
 21.60J *Hartree-Fock and random-phase approximations*
 21.65 Nuclear matter
 21.80 Hypernuclei
 21.90 Other topics in nuclear structure
- 23.00 RADIOACTIVITY AND ELECTROMAGNETIC TRANSITIONS
 23.20 Electromagnetic transitions
 23.20C *Lifetimes and transition probabilities*
 23.20N *Internal conversion and extranuclear effects*
 23.40 beta decay; electron and muon capture
 23.60 alpha decay
 23.90 Other topics in nuclear decay and radioactivity
- 24.00 NUCLEAR REACTIONS AND SCATTERING: GENERAL
 24.10 Nuclear reaction and scattering models and methods
 24.10H *Optical and diffraction models*
 24.30 Resonance reactions and scattering
 24.50 Direct reactions
 24.60 Statistical theory and fluctuations
 24.70 Polarization in reactions and scattering
 24.75 General properties of fission
 24.90 Other topics in nuclear reactions and scattering, general
- 25.00 NUCLEAR REACTIONS AND SCATTERING: SPECIFIC REACTIONS
 25.10 Nuclear reactions and scattering involving few-nucleon systems
 25.20 Photonuclear reactions and photon scattering
 25.30 Lepton-induced reactions and scattering
 25.40 Nucleon-induced reactions and scattering
 25.50 ^2H - and ^3H -induced reactions and scattering
 25.60 ^3He - and ^4He -induced reactions and scattering
 25.70 Heavy ion induced reactions and scattering
 25.80 Meson- and hyperon-induced reactions and scattering
 25.85 Fission reactions
 25.88 Fusion reactions
 25.90 Other topics in nuclear reactions and scattering: specific reactions
- 27.00 PROPERTIES OF SPECIFIC NUCLEI LISTED BY MASS RANGES
 27.10 $A \leq 5$
 27.20 $6 \leq A \leq 19$
 27.30 $20 \leq A \leq 38$
 27.40 $39 \leq A \leq 58$
 27.50 $59 \leq A \leq 89$
 27.60 $90 \leq A \leq 149$
 27.70 $150 \leq A \leq 189$
 27.80 $190 \leq A \leq 219$
 27.90 $220 \leq A$
- 28.00 NUCLEAR ENGINEERING AND NUCLEAR POWER STUDIES
 28.20 Neutron physics
 28.41 Fission reactor theory and design
 28.42 Fission reactor materials
 28.42H *Fuel preparation and reprocessing*
 28.43 Fission reactor operation
 28.44 Fission reactor protection systems, safety and accidents
 28.47 Fission reactor decommissioning
 28.50 Fission reactor types and applications
 28.52 Fusion reactors
- 28.58 Integrated reactor systems
 28.70 Nuclear explosions
 28.75 Radioactive waste, transportation, disposal, storage, treatment
 28.80 Radiation technology, including shielding
 28.90 Other topics in nuclear engineering and nuclear power studies
- 29.00 EXPERIMENTAL METHODS AND INSTRUMENTATION FOR ELEMENTARY-PARTICLE AND NUCLEAR PHYSICS
 29.10 Preacceleration (injection)
 29.15 Electrostatic and linear particle accelerators
 29.20 Cyclic accelerators and storage facilities
 29.25 Particle sources and targets, preparation and technology
 29.30 Radiation spectrometers and spectroscopic techniques
 29.40 Radiation detectors
 29.60 Counting circuits and nuclear electronics
 29.70 Radiation measurement, detection and counting
 29.75 Polarization analysis
 29.80 Nuclear information processing
 29.90 Other topics in high-energy and nuclear experimental methods and instrumentation
- 30.00 ATOMIC AND MOLECULAR PHYSICS
 31.00 THEORY OF ATOMS AND MOLECULES
 31.10 General theory of structure, transitions and chemical binding
 31.15 General mathematical and computational developments
 31.20 Specific calculations and results
 31.20D *Complete ab initio calculations (exact or nearly exact calculations on small species)*
 31.20E *Ab initio LCAO and GO SCF calculations*
 31.20G *Other accurate, or nearly ab initio calculations (DIM method, SAMO method, Xa method etc.)*
 31.20L *Statistical model calculations (Thomas-Fermi and Thomas-Fermi-Dirac models)*
 31.20N *Semi-empirical NDO calculations (CNDO, INDO, MINDO, PCILO methods, etc.)*
 31.20P *Other semi-empirical calculations (Hückel, generalized Hückel, PPP methods, etc.)*
 31.20R *Valence bond calculations (ab initio or not)*
 31.20T *Electron correlation and CI calculations*
 31.20W *Empirical methods (nonquantum methods for conformations)*
 31.30 Electronic structure, corrections and effects of interactions
 31.30G *Hyperfine interactions and isotope effects*
 31.30J *Radiative and relativistic effects*
 31.30L *Environmental and solvent effects*
 31.30N *Molecular solids*
 31.50 Excited states
 31.70 Effects of molecular interactions on electronic structure
 31.90 Other topics in the theory of atoms and molecules
- 32.00 ATOMIC SPECTRA AND INTERACTIONS WITH PHOTONS
 32.20 Atomic spectra grouped by wavelength ranges
 32.20D *Radiofrequency and microwave spectra*
 32.20F *Infrared and Raman spectra*
 32.20J *Visible and ultraviolet spectra*
 32.20R *X-ray spectra*
 32.40 Magnetic resonance spectra
 32.50 Fluorescence, phosphorescence; radiationless transitions
 32.50F *Fluorescence, phosphorescence*
 32.50H *Radiationless transitions*

- 32.60 Magneto-optical and electro-optical spectra
 32.60S *Stark effect*
 32.60V *Zeeman effect*
 32.70 Spectral line shapes and intensities
 32.80 Photon interactions with atoms
 32.80B *Level crossing, optical pumping, population inversion*
 32.80D *Autoionization*
 32.80F *Photoionization, photodetachment, photoelectron spectra*
 32.80H *Auger effect and inner-shell ionization*
 32.80K *Multiphoton processes*
 32.90 Other topics in atomic spectra and interactions with photons
- 33.00 MOLECULAR SPECTRA AND INTERACTIONS WITH PHOTONS
 33.10 Calculation of molecular spectra
 33.20 Molecular spectra grouped by wavelength ranges
 33.20B *Radiofrequency and microwave spectra*
 33.20E *Infrared spectra*
 33.20F *Raman and Rayleigh spectra*
 33.20K *Visible spectra*
 33.20L *Ultraviolet spectra*
 33.20N *Vacuum ultraviolet spectra*
 33.20R *X-ray spectra*
 33.25 Nuclear magnetic resonance and relaxation; nuclear quadrupole resonance (NQR)
 33.30 Electron paramagnetic resonance and relaxation
 33.35 Double resonances and other multiple resonances
 33.35H *MODR and PMDR (microwave optical double resonance and phosphorescence microwave double resonance)*
 33.40 Mössbauer spectra
 33.45 Magneto-optical and electro-optical spectra; dichroism
 33.45B *Zeeman and Stark effects*
 33.45C *Magnetic circular dichroism*
 33.50 Fluorescence, phosphorescence; radiationless transitions (intersystem crossing, internal conversion)
 33.65 Photoelectron spectra
 33.70 Intensities and shapes of molecular spectral lines and bands
 33.80 Photon interactions with molecules
 33.80B *Level crossing and optical pumping*
 33.80E *Autoionization, photoionization, and photodetachment*
 33.80G *Diffuse spectra; predissociation, photodissociation*
 33.80K *Multiphoton processes*
 33.90 Other topics in molecular spectra and interactions with photons
- 34.00 ATOMIC AND MOLECULAR COLLISION PROCESSES AND INTERACTIONS
 34.10 General theories and models
 34.20 Interatomic and intermolecular potentials and forces
 34.30 Potential energy surfaces for collisions
 34.40 Elastic scattering of atoms and molecules
 34.50 Inelastic scattering of atoms and molecules
 34.50E *Rotational and vibrational energy transfer*
 34.50H *Electronic excitation and ionization (including beam-foil excitation and ionization)*
 34.50L *Chemical reactions, energy disposal, and angular distribution, as studied by atomic and molecular beams*
 34.70 Charge transfer
 34.80 Electron scattering, electron spectra
 34.80B *Elastic scattering of electrons by atoms and molecules*
 34.80D *Atomic excitation and ionization by electron impact*
 34.80G *Molecular excitation, ionization and dissociation by electron impact*
- 34.90 Other topics in atomic and molecular collision processes and interactions
- 35.00 PROPERTIES OF ATOMS AND MOLECULES; INSTRUMENTS AND TECHNIQUES
 35.10 Atoms
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 35.10F *Fine- and hyperfine-structure constants*
 35.10H *Ionization potentials, electron affinities*
 35.10W *Weak interactions*
 35.20 Molecules
 35.20B *General molecular conformation and symmetry; stereochemistry*
 35.20D *Interatomic distances and angles*
 35.20G *Bond strengths, dissociation energies, hydrogen bonding, etc.*
 35.20J *Barrier heights (internal rotation, inversion); rotational isomerism, conformational dynamics*
 35.20M *Electric and magnetic moments (and derivatives), polarizability, and magnetic susceptibility*
 35.20P *Rotation, vibration, and vibration-rotation constants*
 35.20S *Hyperfine- and fine-structure constants*
 35.20V *Ionization potentials, electron affinities, molecular core binding energy*
 35.20W *Weak interactions*
 35.20X *Mass spectra*
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 35.80 Atomic and molecular measurements and techniques
- 36.00 STUDIES OF SPECIAL ATOMS AND MOLECULES
 36.10 Exotic atoms and molecules (containing mesons, muons, and other abnormal particles)
 36.20 Macromolecules and polymer molecules
 36.40 Atomic and molecular clusters
 36.90 Other special atoms and molecules
- 40.00 CLASSICAL AREAS OF PHENOMENOLOGY
 41.00 ELECTRICITY AND MAGNETISM: FIELDS AND CHARGED PARTICLES
 41.10 Classical electromagnetism
 41.10D *Electrostatics, magnetostatics*
 41.10F *Steady-state electromagnetic fields; electromagnetic induction*
 41.10H *Electromagnetic waves: theory*
 41.70 Particles in electromagnetic fields: classical aspects
 41.80 Particle beams and particle optics
 41.80D *Electron beams and electron optics*
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 41.90 Other topics in electricity and magnetism
- 42.00 OPTICS
 42.10 Propagation and transmission in homogeneous media
 42.20 Propagation and transmission in inhomogeneous media
 42.30 Optical information, image formation and analysis
 42.40 Holography
 42.50 Quantum optics
 42.52 Masers
 42.55 Lasing processes
 42.55B *General theory of lasing action*
 42.55D *CO₂ lasers*
 42.55F *Inert gas lasers*
 42.55H *Lasing action in other gas lasers*
 42.55K *Chemical lasers*
 42.55M *Lasing action in liquids and organic dyes*
 42.55P *Lasing action in semiconductors with junctions*

- 42.55R *Lasing action in other solids*
 42.55T *Free electron lasers*
 42.60 Laser systems and laser beam applications
 42.60B *Design of specific laser systems*
 42.60D *Laser resonators and cavities*
 42.60F *Laser beam modulation*
 42.60H *Optical problems related to properties and interactions of laser beams*
 42.60K *Optical problems related to applications of laser beams*
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 42.65C *Stimulated Raman, Brillouin and Rayleigh scattering; parametric oscillations and harmonic generation*
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 42.78 Optical lens and mirror systems
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 42.80 Optical devices, techniques and applications
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- 43.00 ACOUSTICS
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 43.45 Statistical studies of acoustical response
 43.50 Noise, its effects and control
 43.55 Architectural acoustics
 43.60 Acoustic signal processing
 43.63 Acoustic holography
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 43.75 Music and musical instruments
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 43.88 Transduction; devices for the generation and reproduction of sound
 43.90 Other topics in acoustics
- 44.00 HEAT FLOW, THERMAL AND THERMODYNAMIC PROCESSES
 44.10 Heat conduction (models, phenomenological description)
 44.25 Convection
 44.30 Heat transfer in inhomogeneous media and through interfaces
 44.40 Heat radiation
 44.50 Thermal properties of matter (phenomenology)
- 44.60 Thermodynamic processes (phenomenology)
 44.90 Other topics in heat flow, thermal and thermodynamic processes
- 46.00 MECHANICS, ELASTICITY, RHEOLOGY
 46.10 Mechanics of discrete systems
 46.20 Continuum mechanics
 46.30 Mechanics of solids
 46.30C *Elasticity*
 46.30J *Viscoelasticity, plasticity, viscoplasticity, creep, and stress relaxation*
 46.30L *Buckling and instability*
 46.30M *Vibrations, aeroelasticity, hydroelasticity, mechanical waves, and shocks*
 46.30N *Fracture mechanics, fatigue, and cracks*
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 46.30R *Measurement methods and techniques*
 46.60 Rheology of fluids and pastes
 46.90 Other topics in mechanics, elasticity, and rheology
- 47.00 FLUID DYNAMICS
 47.10 General theory
 47.15 Laminar flows
 47.15C *Laminar boundary layers*
 47.15F *Stability of laminar flows*
 47.20 Hydrodynamic stability and instability
 47.25 Turbulent flows, convection, and heat transfer
 47.25C *Isotropic turbulence*
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 47.25J *Turbulent diffusion*
 47.25M *Noise (turbulence generated)*
 47.25Q *Convection and heat transfer*
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 47.40 Compressible flows; shock and detonation phenomena
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 47.60 Flows in ducts, channels, and conduits
 47.65 Magnetohydrodynamics and electrohydrodynamics
 47.70 Reactive, radiative, or nonequilibrium flows
 47.75 Relativistic fluid dynamics
 47.80 Instrumentation for fluid dynamics
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- 50.00 FLUIDS, PLASMAS, AND ELECTRIC DISCHARGES
- 51.00 KINETIC AND TRANSPORT THEORY OF FLUIDS; PHYSICAL PROPERTIES OF GASES
 51.10 Kinetic and transport theory
 51.20 Viscosity and diffusion: experimental
 51.30 Thermal properties of gases
 51.40 Acoustical properties of gases; ultrasonic relaxation
 51.50 Electrical phenomena in gases
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- 51.70 Optical phenomena in gases
51.90 Other topics in the physics of fluids
- 52.00 **THE PHYSICS OF PLASMAS AND ELECTRIC DISCHARGES**
52.20 Elementary processes in plasma
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52.20H *Atomic, molecular, heavy-particle collisions*
52.25 Plasma basic properties
52.25F *Transport properties*
52.25P *Emission, absorption, and scattering of radiation*
52.30 Plasma flow; magnetohydrodynamics
52.35 Waves, oscillations, and instabilities in plasma
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52.40 Plasma interactions
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52.40H *Solid-plasma interactions*
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52.50 Plasma production and heating
52.50J *Plasma production and heating by laser beams*
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52.55 Plasma equilibrium and confinement
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52.65 Plasma simulation
52.70 Plasma diagnostic techniques and instrumentation
52.75 Plasma devices and applications
52.80 Electric discharges
52.90 Other topics in plasma physics and electric discharges
- 60.00 **CONDENSED MATTER: STRUCTURE, THERMAL AND MECHANICAL PROPERTIES**
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61.20 Classical, semiclassical, and quantum theories of liquid structure
61.25 Studies of specific liquid structures
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61.30 Liquid crystals
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61.50 Crystalline state
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61.70D *Colour centres*
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61.70G *Dislocations: theory*
61.70J *Etch pits, decoration, transmission electron-microscopy and other direct observations of dislocations*
61.70L *Slip, creep, internal friction and other indirect evidence of dislocations*
61.70N *Grain and twin boundaries*
61.70P *Stacking faults, stacking fault tetrahedra and other planar or extended defects*
61.70R *Crystal impurities: general*
61.70T *Doping and implantation of impurities*
61.70W *Impurity concentration, distribution, and gradients*
61.70Y *Interaction between different crystal structure defects*
61.80 Radiation damage and other irradiation effects
61.80B *Laser beams*
61.80C *X-rays*
61.80E *Gamma rays*
61.80F *Electrons and positrons*
61.80H *Neutrons*
61.80J *Ions*
61.80L *Atoms and molecules*
61.80M *Channelling, blocking and energy loss of particles*
61.90 Other topics in structure of liquids and solids
- 62.00 **MECHANICAL AND ACOUSTIC PROPERTIES OF CONDENSED MATTER**
62.10 Mechanical properties of liquids
62.20 Mechanical properties of solids (related to microscopic structure)
62.20D *Elastic constants*
62.20F *Deformation and plasticity*
62.20H *Creep*
62.20M *Fatigue, brittleness, fracture, and cracks*
62.20P *Tribology*
62.30 Mechanical and elastic waves
62.40 Anelasticity, internal friction, and damping
62.50 High-pressure and shock-wave effects in solids
62.60 Acoustic properties of liquids
62.65 Acoustic properties of solids
62.80 Ultrasonic relaxation
62.90 Other topics in mechanical and acoustical properties of condensed matter
- 63.00 **LATTICE DYNAMICS AND CRYSTAL STATISTICS**
63.10 General theory
63.20 Phonons and vibrations in crystal lattices
63.20D *Phonon states and bands, normal modes, and phonon dispersion*
63.20H *Phonon-phonon interactions*
63.20K *Phonon-electron interactions*
63.20M *Phonon-defect interactions*
63.20P *Localized modes*
63.50 Vibrational states in disordered systems
63.70 Statistical mechanics of lattice vibrations
63.75 Statistical mechanics of displacive phase-transitions
63.90 Other topics in lattice dynamics and crystal statistics

- 64.00 EQUATIONS OF STATE, PHASE EQUILIBRIA, AND PHASE TRANSITIONS
- 64.10 General theory of equations of state and phase equilibria
- 64.30 Equations of state of specific substances
- 64.60 General studies of phase transitions
- 64.70 Phase equilibria, phase transitions, and critical points
- 64.70D Solid-liquid transitions
- 64.70F Liquid-vapour transitions
- 64.70H Solid-vapour transitions
- 64.70J Liquid-liquid transitions
- 64.70K Solid-solid transitions
- 64.70M Transitions in liquid crystals
- 64.70P Glass transitions
- 64.75 Solubility, segregation, and mixing
- 64.80 Other phase properties of systems
- 64.90 Other topics in equations of state, phase equilibria, and phase transitions
- 65.00 THERMAL PROPERTIES OF CONDENSED MATTER
- 65.20 Heat capacities of liquids
- 65.40 Heat capacities of solids
- 65.50 Thermodynamic properties and entropy
- 65.70 Thermal expansion and thermomechanical effects
- 65.90 Other topics in thermal properties of condensed matter
- 66.00 TRANSPORT PROPERTIES OF CONDENSED MATTER (NONELECTRONIC)
- 66.10 Diffusion and ionic conduction in liquids
- 66.20 Diffusive momentum transport
- 66.30 Diffusion in solids
- 66.30D Theory of diffusion and ionic conduction in solids
- 66.30F Self-diffusion in metals, semimetals, and alloys
- 66.30H Self-diffusion and ionic conduction in nonmetals
- 66.30J Diffusion, migration, and displacement of impurities
- 66.30L Diffusion, migration, and displacement of other defects
- 66.30N Chemical interdiffusion
- 66.30Q Electromigration
- 66.60 Thermal conduction in nonmetallic liquids
- 66.70 Nonelectronic thermal conduction and heat-pulse propagation in nonmetallic solids
- 66.90 Other topics in nonelectronic transport properties
- 67.00 QUANTUM FLUIDS AND SOLIDS; LIQUID AND SOLID HELIUM
- 67.20 Quantum effects on the structure and dynamics of nondegenerate fluids
- 67.40 Boson degeneracy and superfluidity of helium-4
- 67.50 Fermi fluids; liquid helium-3
- 67.60 Mixed systems; liquid helium 3-4 mixtures
- 67.70 Films
- 67.80 Solid helium and related quantum crystals
- 67.90 Other topics in quantum fluids and solids (e.g. neutron-star matter)
- 68.00 SURFACES AND INTERFACES: THIN FILMS AND WHISKERS
- 68.10 Fluid surfaces and interfaces with fluids
- 68.15 Liquid thin films
- 68.20 Solid surface structure
- 68.25 Mechanical and acoustical properties of solid surfaces and interfaces
- 68.30 Dynamics of solid surfaces and interface vibrations
- 68.40 Surface energy of solids; thermodynamic properties
- 68.45 Solid-fluid interface processes
- 68.48 Solid-solid interfaces
- 68.55 Thin film growth, structure, and epitaxy
- 68.60 Physical properties of thin films, nonelectronic
- 68.70 Whiskers and dendrites: growth, structure, and nonelectronic properties
- 68.90 Other topics in the structure and nonelectronic properties of surfaces and thin films
- 70.00 CONDENSED MATTER: ELECTRONIC STRUCTURE, ELECTRICAL, MAGNETIC, AND OPTICAL PROPERTIES
- 71.00 ELECTRON STATES
- 71.10 General theories and computational techniques
- 71.20 Electronic density of states determinations
- 71.25 Nonlocalized single-particle electronic states
- 71.25C Techniques of band-structure calculation (general theory, applications of group theory, analytic continuation, etc.)
- 71.25H Measurement of Fermi surface parameters
- 71.25J Effective mass and g-factors
- 71.25L Electron energy states in liquid metals
- 71.25M Electron energy states in amorphous and glassy solids
- 71.25P Band structure of crystalline metals
- 71.25R Band structure of crystalline elemental semiconductors
- 71.25T Band structure of crystalline semiconductor compounds and insulators
- 71.30 Metal-insulator transitions
- 71.35 Excitons and related phenomena
- 71.36 Polaritons
- 71.38 Polarons and electron-phonon interactions
- 71.45 Collective effects
- 71.45G Exchange, correlation, dielectric and magnetic functions, plasmons
- 71.45J Fermi-Thomas model
- 71.45N Calculations of total electronic binding energy
- 71.50 Localized single-particle electronic states
- 71.55 Impurity and defect levels
- 71.55J Localization in disordered structures
- 71.65 Positron states
- 71.70 Level splitting and interactions
- 71.70C Crystal and ligand fields
- 71.70E Spin-orbit coupling, Zeeman, Stark and strain splitting
- 71.70G Exchange interactions
- 71.70J Nuclear states and interactions
- 71.70M Other bulk localized states
- 71.90 Other topics in electron states
- 72.00 ELECTRONIC TRANSPORT IN CONDENSED MATTER
- 72.10 Theory of electronic transport; scattering mechanisms
- 72.15 Electronic conduction in metals and alloys
- 72.15C Electrical and thermal conduction in amorphous and liquid metals and alloys
- 72.15E Electrical and thermal conduction in crystalline metals and alloys
- 72.15G Galvanomagnetic and other magnetotransport effects
- 72.15H Thermomagnetic effects
- 72.15J Thermoelectric effects
- 72.15L Relaxation times and mean free paths
- 72.15N Collective modes; e.g. in one-dimensional conductors
- 72.15Q Scattering mechanisms and Kondo effect
- 72.20 Conductivity phenomena in semiconductors and insulators
- 72.20D General theory, scattering mechanisms
- 72.20F Low-field transport and mobility; piezoresistance
- 72.20H High-field and nonlinear effects
- 72.20J Charge carriers: generation, recombination, lifetime, and trapping

- 72.20M *Galvanomagnetic and other magnetotransport effects*
 72.20N *Thermomagnetic effects*
 72.20P *Thermoelectric effects*
 72.30 *High-frequency effects; plasma effects*
 72.40 *Photoconduction and photovoltaic effects; photodielectric effects*
 72.50 *Acoustoelectric effects*
 72.55 *Magnetoacoustic effects*
 72.60 *Mixed conductivity and conductivity transitions*
 72.70 *Noise processes and phenomena*
 72.80 *Conductivity of specific semiconductors and insulators*
 72.80C *Elemental semiconductors*
 72.80E *III-V and II-VI semiconductors*
 72.80G *Transition-metal compounds*
 72.80J *Other crystalline inorganic semiconductors*
 72.80L *Organic semiconductors*
 72.80N *Amorphous and glassy semiconductors*
 72.80P *Liquid semiconductors*
 72.90 *Other topics in electronic transport in condensed matter*
- 73.00 **ELECTRONIC STRUCTURE AND ELECTRICAL PROPERTIES OF SURFACES, INTERFACES, AND THIN FILMS**
 73.20 *Electronic surface states*
 73.25 *Surface conductivity*
 73.30 *Surface double layers, Schottky barriers, and work functions*
 73.40 *Interfaces*
 73.40B *Static electrification*
 73.40G *Tunnelling: general*
 73.40J *Metal-to-metal contacts*
 73.40L *Semiconductor-to-semiconductor contacts, p-n junctions, and heterojunctions*
 73.40M *Semiconductor-electrolyte contacts*
 73.40N *Metal-nonmetal contacts*
 73.40Q *Metal-insulator-semiconductor structures*
 73.40R *Metal-insulator-metal structures*
 73.40S *Metal-semiconductor-metal structures*
 73.40T *Semiconductor-insulator-semiconductor structures*
 73.40V *Semiconductor-metal-semiconductor structures*
 73.60 *Electronic properties of thin films*
 73.60D *Metallic thin films*
 73.60F *Semiconductor films*
 73.60H *Insulating thin films*
 73.60K *Superconducting films*
 73.90 *Other topics in electrical properties of surfaces, interfaces, and thin films*
- 74.00 **SUPERCONDUCTIVITY**
 74.10 *Occurrence, critical temperature*
 74.20 *Theory*
 74.20F *BCS theory and its applications*
 74.30 *General properties*
 74.30C *Magnetization curves, Meissner effect, penetration depth*
 74.30E *Thermodynamic properties; thermal conductivity*
 74.30G *Response to electromagnetic fields, nuclear magnetic resonance, ultrasonic attenuation*
 74.40 *Fluctuations and critical effects*
 74.50 *Proximity effects, tunnelling phenomena, and Josephson effect*
 74.55 *Type-I superconductivity*
 74.60 *Type-II superconductivity*
 74.60E *Mixed state, H_{c2} surface sheath*
 74.60G *Flux pinning; fluxon-defect interactions*
 74.60J *Critical currents*
- 74.70 *Superconducting materials*
 74.70D *Material effects on T_c , K , critical currents*
 74.70G *Type-I superconductors (nontransition metals)*
 74.70L *Type-II superconductors (transition metals, alloys and compounds)*
 74.70N *Dirty superconductors*
 74.70P *Materials for high-field applications*
 74.90 *Other topics in superconductivity*
- 75.00 **MAGNETIC PROPERTIES AND MATERIALS**
 75.10 *General theory and models of magnetic ordering*
 75.10D *Crystal-field theory and spin Hamiltonians*
 75.10H *Ising and other classical spin models*
 75.10J *Heisenberg and other quantized localized spin models*
 75.10L *Band and itinerant models*
 75.20 *Diamagnetism and paramagnetism*
 75.20C *Nonmetals*
 75.20E *Metals and alloys*
 75.20H *Local moment in dilute alloys; Kondo effect*
 75.25 *Spin arrangements in magnetically ordered materials (neutron studies, etc.)*
 75.30 *Magnetically ordered materials, other intrinsic properties*
 75.30C *Saturation moments and magnetic susceptibility*
 75.30D *Spin waves*
 75.30E *Exchange and superexchange interactions*
 75.30G *Anisotropy*
 75.30H *Magnetic impurity interactions*
 75.30K *Magnetic phase boundaries*
 75.30S *Magnetocaloric effect*
 75.40 *Critical-point effects, specific heats, short-range order*
 75.40D *Ising and other classical spin models*
 75.40F *Heisenberg and other quantized spin models*
 75.50 *Studies of specific magnetic materials*
 75.50B *Ferromagnetism of Fe and its alloys*
 75.50C *Ferromagnetism of other metals*
 75.50D *Ferromagnetism of nonmetals*
 75.50E *Antiferromagnetics*
 75.50G *Ferrimagnetics*
 75.50K *Amorphous magnetic materials*
 75.50M *Magnetic liquids*
 75.60 *Domain effects, magnetization curves, and hysteresis*
 75.60C *Domain walls and domain structure*
 75.60E *Magnetization curves, hysteresis, Barkhausen and related effects*
 75.60G *High coercivity materials*
 75.60J *Fine-particle systems*
 75.60L *Magnetic aftereffects*
 75.60N *Magnetic annealing and temperature-hysteresis effects*
 75.70 *Magnetic films and plates*
 75.70K *Domain structure (magnetic bubbles)*
 75.80 *Magnetomechanical and magnetoelectric effects, magnetostriction*
 75.90 *Other topics in magnetic properties and materials*
- 76.00 **MAGNETIC RESONANCES AND RELAXATION IN CONDENSED MATTER; MÖSSBAUER EFFECT**
 76.20 *General theory of resonances and relaxation*
 76.30 *Electron paramagnetic resonance and relaxation*
 76.30D *Ions and impurities: general*
 76.30F *Iron group (3d) ions and impurities (Ti-Cu)*
 76.30H *Platinum and palladium group (4d and 5d) ions and impurities (Zr-Ag and Hf-Au)*
 76.30K *Rare-earth ions and impurities*
 76.30L *Other ions and impurities*
 76.30M *Colour centres and other defects*

- 76.30P *Conduction electrons*
 76.30R *Free radicals*
 76.40 Diamagnetic and cyclotron resonances
 76.50 Ferromagnetic, antiferromagnetic, and ferrimagnetic resonances; spin wave resonance
 76.60 Nuclear magnetic resonance and relaxation
 76.60C *Chemical and Knight shifts*
 76.60E *Relaxation effects*
 76.60G *Quadrupole resonance*
 76.60L *Spin echoes*
 76.70 Magnetic double resonances and cross effects
 76.70D *Electron-nuclear double resonance (ENDOR)*
 76.70E *Dynamical nuclear polarization*
 76.70F *Double nuclear magnetic resonance (DNMR)*
 76.70H *Optical double magnetic resonance (ODMR)*
 76.70K *Electron double resonance (ELDOR)*
 76.80 Mössbauer effect; other gamma-ray spectroscopy
 76.90 Other topics in magnetic resonances and relaxation
- 77.00 DIELECTRIC PROPERTIES AND MATERIALS
 77.20 Permittivity
 77.30 Polarization and depolarization effects
 77.40 Dielectric loss and relaxation
 77.50 Dielectric breakdown and space-charge effects
 77.55 Dielectric thin films
 77.60 Piezoelectricity and electrostriction
 77.70 Pyroelectric and electrocaloric effects
 77.80 Ferroelectricity and antiferroelectricity
 77.80B *Transitions and Curie point*
 77.80D *Domain structure and effects; hysteresis*
 77.85 Electrical resonances
 77.90 Other topics in dielectric properties and materials
- 78.00 OPTICAL PROPERTIES AND CONDENSED MATTER SPECTROSCOPY AND OTHER INTERACTIONS OF MATTER WITH PARTICLES AND RADIATION
 78.20 Optical properties and materials
 78.20B *General theory (for pure homogeneous materials)*
 78.20D *Optical constants and parameters*
 78.20E *Optical rotatory power*
 78.20F *Birefringence*
 78.20H *Piezo-, elasto- and acousto-optical effects*
 78.20J *Electro-optical effects*
 78.20L *Magneto-optical effects*
 78.20N *Thermo-optical effects*
 78.30 Infrared and Raman spectra and scattering
 78.35 Brillouin and Rayleigh scattering
 78.40 Visible and ultraviolet spectra
 78.45 Stimulated emission
 78.50 Impurity and defect absorption in solids
 78.55 Photoluminescence
 78.60 Other luminescence spectra and radiative recombination
 78.60F *Electroluminescence*
 78.60H *Cathodoluminescence, ionoluminescence*
 78.60K *Thermoluminescence*
 78.60M *Sonoluminescence, triboluminescence*
 78.60P *Chemiluminescence*
 78.65 Optical properties of thin films
 78.70 Other interactions of matter with particles and radiation
 78.70B *Positron annihilation*
 78.70C *X-ray scattering*
 78.70D *X-ray absorption and absorption edges*
 78.70E *X-ray emission threshold and fluorescence*
 78.70G *Microwave and radiofrequency spectra*
 78.90 Other topics in optical properties of condensed matter and other interactions of matter with particles and radiation
- 79.00 ELECTRON AND ION EMISSION BY LIQUIDS AND SOLIDS; IMPACT PHENOMENA
 79.20 Impact phenomena
 79.20D *Laser-light impact phenomena*
 79.20F *Electron impact: Auger emission*
 79.20H *Electron impact: secondary emission*
 79.20K *Other electron impact phenomena*
 79.20N *Atom, molecule, and ion impact*
 79.20R *Atomic and molecular beam interactions*
 79.40 Thermionic emission
 79.60 Photoemission and photoelectron spectra
 79.70 Field emission and field ionization
 79.75 Exoelectron emission
 79.80 Resonance tunnelling
 79.90 Other topics in emission and impact phenomena in condensed matter
- 80.00 CROSS-DISCIPLINARY PHYSICS AND RELATED AREAS OF SCIENCE AND TECHNOLOGY
- 81.00 MATERIALS SCIENCE
 81.10 Methods of crystal growth and purification
 81.10B *Growth from vapour*
 81.10D *Growth from solutions*
 81.10F *Growth from melts*
 81.10H *Zone melting and zone refining*
 81.10J *Growth from solid phases*
 81.15 Methods of thin film deposition
 81.15C *Deposition by cathodic sputtering*
 81.15G *Vacuum deposition*
 81.15H *Chemical vapour deposition*
 81.15J *Ion plating and other vapour deposition*
 81.15L *Deposition from liquid phases (melts and solutions)*
 81.20 Other methods of preparation of materials
 81.20C *Vacuum methods*
 81.20E *Powder techniques, compaction and sintering*
 81.20G *Specific metals and alloys (compacts, pseudoalloys)*
 81.20J *Dispersion-, fibre- and platelet-reinforced metal-based composites*
 81.20L *Ceramics and refractories*
 81.20N *Cermets, ceramic and refractory composites*
 81.20P *Glasses*
 81.20Q *Glass-based composites, vitroceraics*
 81.20S *Polymers*
 81.20T *Reinforced polymers and polymer-based composites*
 81.30 Phase diagrams and microstructures developed by solidification and solid-solid phase transformations
 81.30B *Phase diagrams of metals and alloys*
 81.30D *Phase diagrams of other materials*
 81.30F *Solidification*
 81.30H *Constant-composition solid-solid phase transformations: polymorphic, massive, order-disorder*
 81.30K *Martensitic transformations*
 81.30M *Precipitation*
 81.40 Treatment of materials and its effects on microstructures and properties
 81.40C *Solid solution hardening, precipitation hardening, dispersion hardening*
 81.40E *Cold working, work hardening; post-deformation annealing, recovery and recrystallisation; textures*
 81.40G *Other heat and thermomechanical treatments*
 81.40J *Elasticity and anelasticity*
 81.40L *Deformation, plasticity and creep*
 81.40N *Fatigue, embrittlement, and fracture*
 81.40P *Friction, lubrication, and wear*
 81.40R *Electrical and magnetic properties (related to*

- treatment conditions*
 81.40T *Optical properties (related to treatment conditions)*
 81.60 Corrosion, oxidation and surface treatments
 81.60B *Metals and alloys*
 81.60C *Semiconductors*
 81.70 Materials testing
 81.70C *Nondestructive testing*
 81.80 Reduced gravity experiments
 81.90 Other topics in materials science
- 82.00 PHYSICAL CHEMISTRY
 82.20 Chemical kinetics
 82.20K *Potential energy surfaces for chemical reactions*
 82.20M *Nonequilibrium kinetics*
 82.20R *Energy distribution and transfer, relaxation*
 82.30 Specific chemical reactions; reaction mechanisms
 82.35 Polymer reactions and polymerization
 82.40 Chemical kinetics and reactions: special regimes
 82.40D *Atomic and molecular beam reactions*
 82.40T *Chemiluminescence and chemical laser kinetics*
 82.45 Electrochemistry and electrophoresis
 82.50 Photochemistry and radiation chemistry
 82.50E *Photodissociation, photoionization as studied by luminescence and radiationless transitions*
 82.55 Radiochemistry
 82.60 Chemical thermodynamics
 82.65 Surface processes
 82.70 Disperse systems
 82.80 Chemical analysis and related physical methods of analysis
 82.90 Other topics in physical chemistry
- 86.00 ENERGY RESEARCH AND ENVIRONMENTAL SCIENCE
 86.10 Energy resources and their utilisation
 86.10B *Fossil and other fuels*
 86.10D *Wind energy*
 86.10F *Tidal and flow energy*
 86.10H *Geothermal energy*
 86.10K *Solar energy*
 86.10N *Nuclear energy*
 86.10Z *Other topics*
 86.30 Energy conversion
 86.30D *Electrochemical conversion: general*
 86.30E *Primary cells*
 86.30F *Secondary cells*
 86.30G *Fuel cells*
 86.30J *Photoelectric conversion: solar cells and arrays*
 86.30K *Photoelectrochemical conversion*
 86.30L *Electrogasdynamic and magnetohydrodynamic conversion*
 86.30M *Thermoelectric conversion*
 86.30N *Thermionic conversion*
 86.30P *Photosynthesis*
 86.30Q *Chemical energy conversion*
 86.30R *Thermal energy conversion (heat engines and heat pumps)*
 86.30S *Photothermal conversion*
 86.30Z *Other topics*
 86.40 Energy storage (secondary energy)
 86.40C *Storage in mechanical energy*
 86.40F *Storage in thermal energy*
 86.40H *Storage in chemical energy*
 86.40K *Hydrogen storage and technology*
 86.40Z *Other topics*
 86.60 Requirement for energy: ecological aspects
- 86.70 Environmental science
 86.70C *Soil*
 86.70E *Water*
 86.70G *Atmosphere*
 86.70J *Noise*
 86.70L *Measurement techniques in environmental science*
 86.70Z *Other topics*
 86.90 Other topics in energy research and environmental science
- 87.00 BIOPHYSICS, MEDICAL PHYSICS, AND BIOMEDICAL ENGINEERING
 87.10 General, theoretical, and mathematical biophysics
 87.15 Molecular biophysics
 87.15B *Structure, configuration, conformation, and active sites at the biomolecular level*
 87.15M *Interactions with radiations at the biomolecular level*
 87.16 Biothermics
 87.20 Membrane biophysics
 87.25 Cellular biophysics
 87.25D *Biological transport; cellular and subcellular transmembrane physics*
 87.30 Biophysics of neurophysiological processes
 87.30C *Electrical activity for excitable and nonexcitable biosystems*
 87.32 Physiological optics, vision
 87.32C *Anatomy and optics of the eye*
 87.32E *Physiology of the eye; nerve structure and function*
 87.32L *Light detection; adaptation and discrimination*
 87.32N *Colour detection; adaptation and discrimination*
 87.32S *Psychophysics of vision, visual perception, binocular vision*
 87.34 Audition
 87.36 Speech
 87.38 Mechano- and chemio-ceptions
 87.40 Biomagnetism
 87.45 Biomechanics, biorheology, biological fluid dynamics
 87.50 Biological effects of radiations
 87.50B *Interactions of biosystems with radiations*
 87.50C *Bioacoustics (sonic and ultrasonic effects on living matter)*
 87.50E *Bio-optics (effects of microwaves, light, laser and other electromagnetic waves)*
 87.50G *Ionizing radiations (UV, X-ray, gamma-ray; particle radiation effects)*
 87.60 Medical and biomedical uses of fields, radiations, and radioactivity
 87.60B *Sonic and ultrasonic radiation*
 87.60D *Electric and magnetic fields (DC and pulsed)*
 87.60G *Laser beams, microwaves, and other electromagnetic waves*
 87.60J *Corpuscular radiation and radioisotopes*
 87.60L *Preparation of radioactive materials for medical and biomedical uses*
 87.60M *Radiation dosimetry*
 87.60P *Radiation protection*
 87.60R *Radioactive pollution*
 87.65 Aerospace biophysics and medical physics (effects of accelerations, weightlessness and environment)
 87.70 Biomedical engineering
 87.70E *Diagnostic methods and instrumentation*
 87.70G *Patient care and treatment*
 87.70J *Prosthetics and other practical applications*
 87.80 Biophysical instrumentation and techniques
 87.90 Other topics in biophysics, medical physics, and biomedical engineering

- 90.00 **GEOPHYSICS, ASTRONOMY AND ASTROPHYSICS**
- 91.00 **SOLID EARTH GEOPHYSICS**
- 91.10 Geodesy and gravity
- 91.25 Geomagnetism and palaeomagnetism; geoelectricity
- 91.30 Seismology
- 91.35 Earth's interior structure and properties
- 91.40 Volcanology
- 91.45 Physics of plate tectonics
- 91.50 Marine geology and geophysics
- 91.60 Physical properties of rocks and minerals
- 91.65 Geophysical aspects of geology, mineralogy and petrology
- 91.90 Other topics in solid Earth geophysics
- 92.00 **HYDROSPHERIC AND ATMOSPHERIC GEOPHYSICS**
- 92.10 Physics of the oceans
- 92.20 Interdisciplinary aspects of oceanography
- 92.40 Hydrology and glaciology
- 92.60 Meteorology
- 92.60S *Climatology*
- 92.65 Atmospheric optics
- 92.90 Other topics in hydrospheric and atmospheric geophysics
- 93.00 **GEOPHYSICAL OBSERVATIONS, INSTRUMENTATION, AND TECHNIQUES**
- 93.30 Information related to geographical regions
- 93.55 International organizations, national and international programs
- 93.65 Data acquisition and storage
- 93.85 Instrumentation and techniques for geophysical research
- 94.00 **AERONOMY AND SPACE PHYSICS**
- 94.10 Physics of the neutral atmosphere
- 94.10Q *Airglow and nightglow*
- 94.10S *Aurora*
- 94.20 Physics of the ionosphere
- 94.30 Physics of the magnetosphere
- 94.40 Cosmic rays
- 94.40C *Origin and propagation outside the solar system*
- 94.40E *Interplanetary propagation and effects*
- 94.40H *Energetic solar particles and photons*
- 94.40K *Solar modulation and geophysical effects*
- 94.40L *Composition and energy spectra*
- 94.40N *Extensive air showers*
- 94.40R *High-energy interactions*
- 94.40T *Muons and neutrinos*
- 94.40V *Cosmic-ray effects in meteorites and terrestrial matter*
- 94.60 Interplanetary space
- 94.80 Aerospace facilities and techniques; space research
- 94.90 Other topics in space physics
- 95.00 **FUNDAMENTAL ASTRONOMY AND ASTROPHYSICS, INSTRUMENTATION AND TECHNIQUES AND ASTRONOMICAL OBSERVATIONS**
- 95.10 Fundamental astronomy
- 95.10C *Celestial mechanics*
- 95.30 Fundamental aspects of astrophysics
- 95.45 Observatories
- 95.55 Astronomical instruments
- 95.65 Auxiliary and recording instruments
- 95.70 Other instrumentation and techniques
- 95.75 Techniques of observation and reduction
- 95.80 Astronomical observations (listed by techniques of observation)
- 95.80D *Radio and radar*
- 95.80G *Far infrared (bolometric, photoconductive)*
- 95.80J *Photographic region (near infrared, visible, and normal ultraviolet)*
- 95.80M *Space ultraviolet*
- 95.80N *X-ray*
- 95.80Q *gamma-ray and elementary particle*
- 95.80S *Other (including gravitational radiation, magnetograms, etc.)*
- 95.85 Catalogues, atlases, etc.
- 95.90 Other topics in astronomy and astrophysics
- 96.00 **SOLAR SYSTEM**
- 96.10 General, solar nebula, and cosmogony
- 96.20 Moon
- 96.30 Planets and satellites
- 96.30D *Mercury*
- 96.30E *Venus*
- 96.30G *Mars*
- 96.30H *Asteroids*
- 96.30K *Jupiter*
- 96.30M *Saturn*
- 96.30T *Other planets*
- 96.50 Other objects in the planetary system
- 96.50D *Interplanetary matter, magnetic and electric fields*
- 96.50G *Comets*
- 96.50K *Meteors, showers and meteoroids*
- 96.50M *Meteorites, micrometeorites*
- 96.60 Solar physics
- 96.90 Other topics on the solar system
- 97.00 **STARS**
- 97.10 Stellar characteristics
- 97.20 Normal stars (by class): general or individual
- 97.30 Variable and peculiar stars
- 97.60 Late stages of stellar evolution
- 97.60B *Supernovae*
- 97.60G *Pulsars*
- 97.60J *Neutron stars*
- 97.60L *Black holes*
- 97.80 Binary and multiple stars
- 97.90 Other topics in stellar astronomy
- 98.00 **STELLAR SYSTEMS; GALACTIC AND EXTRAGALACTIC OBJECTS AND SYSTEMS; THE UNIVERSE**
- 98.10 Stellar dynamics
- 98.20 Stellar clusters and associations
- 98.40 Interstellar matter; and nebulae
- 98.50 The Galaxy, extragalactic objects and systems
- 98.50K *Groups, clusters, superclusters*
- 98.70 Other objects and background radiations of unknown origin and distances
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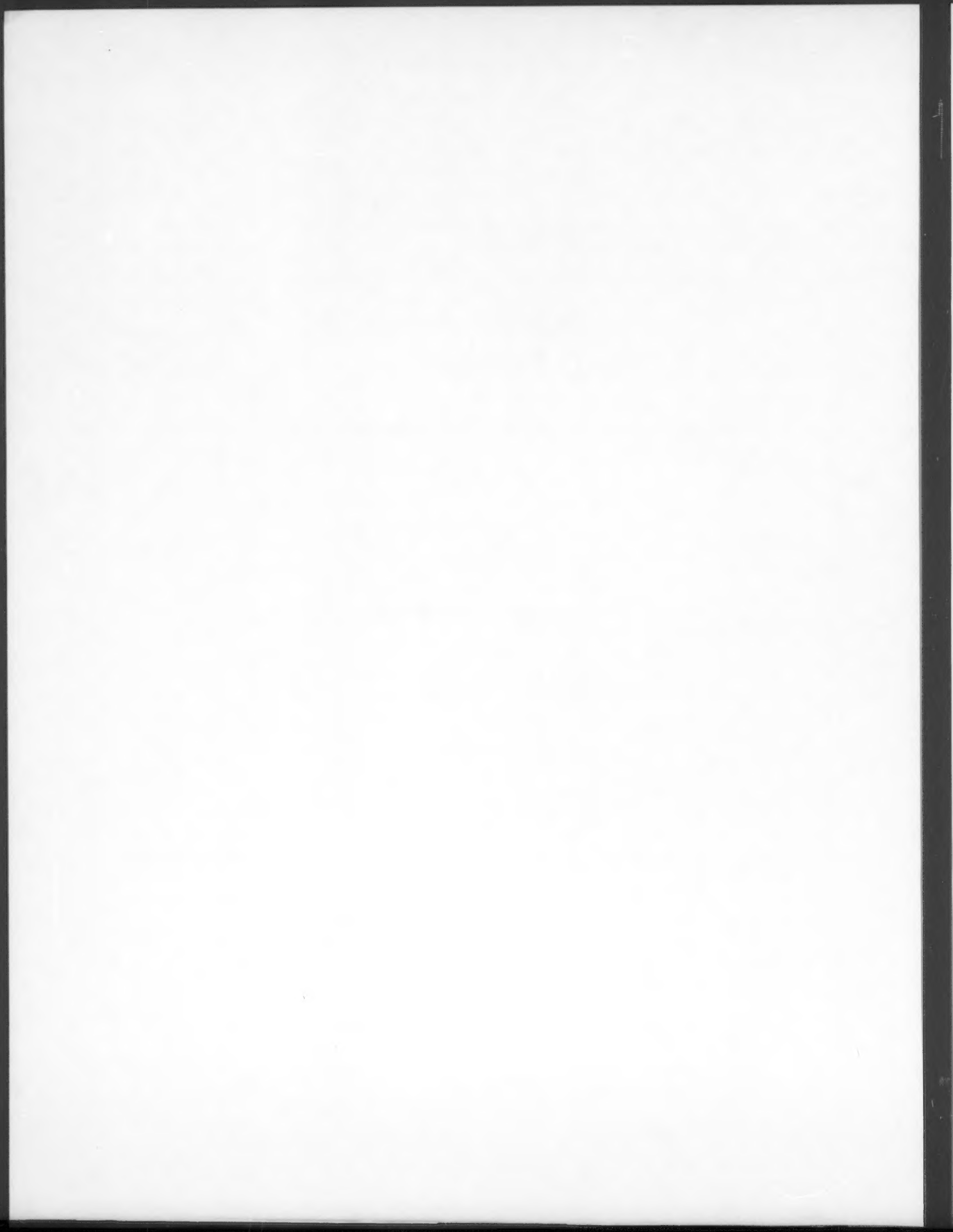
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